Organizational Results

November 2005

Strategic Research Vision

2006-2010

Missouri Department of Transportation

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Overview

On June 1, 2005, the Organizational Results Division was formed to provide support and consultation to MoDOT managers in achieving our 18 tangible results. Research is an important tool in identifying and closing performance gaps. Our challenge is to focus on research projects that will have the greatest impact on delivering a world-class transportation experience that delights our customers and promotes a prosperous Missouri. Our approach is dependent upon partnering with public and privates sectors, as well as taking full advantage of best practices and innovation.

Literally hundreds of interviews have been held with MoDOT managers, technologists, practitioners and our external research partners to identify potential research topics that could help us deliver our 18 tangible results. The culmination of this assessment was a daylong brainstorming session with nearly 40 internal and external research partners. A prioritized list of research topics from that session was compared with earlier interviews to produce ten research focus areas. Each of these areas addresses multiple tangible results. Current research was checked for alignment with the vision.

The MoDOT Strategic Research Vision will serve as a critical, over-arching guide as we further define our program in the coming years. Organizational Results managers will work closely with department managers and other transportations experts to identify specific research ideas, within each of the ten focus areas, recognized to close performance gaps and having the greatest impact on our organization. Collaborative partnerships with the Missouri Transportation Institute and others will enable us to transform these research ideas into full research projects carried out by the best, most qualified researchers and incorporating the most innovative concepts. The make-up of each year's annual research program should reflect our ongoing efforts to pursue the right projects in the right areas, making a positive difference to Missouri's transportation program.

Research Focus Areas

Highway Safety

Highway safety is simply a top priority of MoDOT, and the department works constantly to minimize the number of fatalities and injuries occurring along Missouri roadways. Whether it's safer work zones, better roadway visibility, improved roadside safety, or effective safety management, new and innovative technologies offer potential solutions for increased safety in these critical areas. Pursuing improved driver education and better understanding of the link between driver behavior and safer roadways are also recognized as notable areas, which encourage highway safety. Advancing research in the area of *Highway Safety* will promote a safer transportation system, uninterrupted traffic flow, roadway visibility, innovative transportation solutions, and efficient movement of goods across Missouri's roadways.

Traffic Management

Keeping traffic moving and limiting traffic hazards are keys to the efficient and safe movement of people and goods across Missouri's transportation system. Congestion, work zones, inclement weather, and unforeseen incidents each contribute to traffic delays and unsafe conditions on our roadways. Expanded knowledge and innovative applications in areas such as construction and work zones, traffic modeling, and incident management are recognized as ways to effectively meet those challenges. Advancing smart technologies, such as ITS and others, allows the communication of immediate and accurate advisory information among motorists and government agencies. These exciting capabilities will provide faster response and decisions, reduced travel delays, minimized incidents, and ultimately lives saved. The overall pursuit of research in the area of *Traffic Management* should support a safer transportation system, roadway visibility, innovative transportation solutions, and promote uninterrupted traffic flow and efficient movement of goods in Missouri.

Transportation Management Systems

Managing MoDOT's transportation assets is a huge undertaking. Making wise business and engineering decisions concerning the upkeep and expansion of Missouri's transportation infrastructure is critical to MoDOT's overall economic and operational health. Advanced knowledge and methodologies in support of improved management of our transportation assets, including bridges, pavements, and roadsides should guide MoDOT in making more cost-effective, infrastructure investment decisions. The well being of our physical system will improve through better and timelier system maintenance, rehabilitation, replacement, and construction operations. Innovative approaches and tools designed to collect and maintain reliable infrastructure performance data, including health monitoring, are needed for not only current performance tracking but also for future performance modeling for allowing improved and advanced decision making. Advancing technology through research in the area of *Transportation Management Systems* should help MoDOT achieve smooth and unrestricted roads and bridges, attractive roadsides, innovative transportation solutions and at the same time obtain the best value for every dollar spent. Additionally, this research will support convenient, clean and safe roadside accommodations and environmental responsibility.

Road & Bridge Design

Providing Missourians with roads and bridges designed to handle traffic and last a long time are core functions at MoDOT. However, increasing traffic demands and an aging infrastructure requires MoDOT to seek out the latest design technologies for the most reliable pavements and bridges. Whether it's new construction, rehabilitation, or retrofitting, our designers need more options to ensure long-lasting performance and that can be constructed under tight schedules or restrictive conditions when needed. In addition, options should allow cost-effective applications appropriately tailored to meet realistic long-term needs. A focus on *Road & Bridge Design* research will help MoDOT provide smooth and unrestricted roads and bridge, fast projects of great value, innovative transportation solutions and the best value for every dollar spent.

Advanced Materials for Roads & Bridges

The performance of Missouri's roads and bridges is highly dependent upon the materials used in their construction and maintenance. The type and quality of materials used are directly related to the overall performance, durability, and service-life of our transportation infrastructure. Needs are great for better performing, cost-effective materials used in constructing, maintaining, rehabilitating and retrofitting roads and bridges. Improved materials must allow rapid placement and use, as well as withstand Missouri's seasonal conditions. High performance materials and innovative concepts, introducing such materials as plastics and recyclables, may potentially bring better value and reliability to our system, while also qualifying as environmentally friendly. Advanced materials testing and evaluation techniques may provide methods for quick answers to ensure immediate and long-term performance. Research in support of *Advanced Materials for Roads & Bridges* will help MoDOT deliver smooth and unrestricted roads and bridges, roadway visibility and the best value for every dollar spent. Advanced materials will also support fast projects of great value, innovative transportation solutions, and the department's efforts toward being environmentally responsible.

Transportation Security

Missourians depend upon MoDOT to provide a secure transportation system. With the recent destruction and devastation occurring in the gulf-coast coupled with the recent four-year anniversary of the September 11 terrorists' attacks, the vulnerability of our nation's infrastructure becomes evident. The physical and economic impacts can be tremendous. Missouri must be proactive and prepared for potential natural or man-made events that could threaten the operation and safety of our transportation system. Research efforts are needed to expand our knowledge and readiness in keeping our system secure. Security gaps and weaknesses must be identified, and proper techniques and resources developed to prepare and protect Missouri's transportation infrastructure. A research focus on *Transportation Security* will help MoDOT provide smooth and unrestricted roads and bridges, uninterrupted traffic flow, and a safe transportation system.

Modal Access & Mobility

While state transportation agencies have typically focused on roads, factors such as increased congestion and traffic delay, fuel costs, environmental issues are leading to a greater demand for alternate modes of transportation. MoDOT needs to expand its understanding of passenger and freight access and mobility via the alternate modes including waterways, rail, air, and passenger services. More information is also needed on the social, environmental and economic benefits of supporting multimodal transportation. Research in *Modal Access & Mobility* will help MoDOT provide easily accessible modal choices and efficient movement of goods. In addition, such research will support environmental responsibility and partnering with others to deliver transportation services.

Economic Issues Related To Transportation

Transportation improvements have long been associated with economic development. The relationship is muddied by the changes in this relationship over time. The transportation system has been mostly built-out, business and industry trends have changed, and there are location specific circumstances leading to development. Information is needed regarding the strength of this relationship, the circumstances under which land use, development, and transportation improvements are most closely linked, as well as how we can use transportation as a catalyst in development of the state and national economies. A focus on *Economic Issues Related to Transportation* will help MoDOT leverage transportation to advance economic development, partner with others to deliver transportation services while providing fast projects that are of great value and the best value for every dollar spent.

Customer Communication & Expectations

Transportation, just like any business, needs to know the "pulse" of its customers to ensure services meet customer needs and expectations. Understanding customers involves understanding how to best communicate with them, as well as understanding how we can best hear their voices. It also includes understanding customer perception and expectations of the services we provide, the look and feel of the transportation system, and even how we conduct business. Studies are needed on the most beneficial levels of customer involvement, the range of customer expectations regarding our facilities, services, and business operations, opportunities to target customer segments, appropriate future technologies to employ, and most importantly, the overall effectiveness of our customer communication. Advancing our knowledge in the area of *Customer Communication & Expectations* will help MoDOT improve both inbound and outbound customer communication, as well as customer involvement in transportation decision-making, attractive roadsides, environmental responsibility, and convenient, clean and safe roadside accommodations.

Funding & Finance Issues

The transportation industry is in an era of unprecedented change marked by unending demands for increased services and infrastructure with a budget that severely restricts the industry's ability to adequately respond. MoDOT must find the best ways to create and expand public-private partnerships, foster innovation in finance, and leverage resources to provide not only the best service for the dollar, but also the most service. Efforts should focus on finding more resources for transportation and stretching the resources we do have. Focusing on *Funding & Finance Issues* will help MoDOT deliver fast project that are of great value and the best value for every dollar spent, partner with others to deliver transportation services, be an advocate for transportation issues and leverage transportation to advance economic development.

Tangible Results by Focus Area

Highway Safety

- Uninterrupted Traffic Flow
- Safe Transportation System
- Roadway Visibility
- Innovative Transportation Solutions
- Efficient Movement of Goods

Traffic Management

- Uninterrupted Traffic Flow
- Safe Transportation System
- Roadway Visibility
- Innovative Transportation Solutions
- Efficient Movement of Goods

Transportation Management Systems

- Smooth and Unrestricted Roads and Bridges
- Innovative Transportation Solutions
- Environmentally Responsible
- Convenient, Clean & Safe Roadside Accommodations
- Best Value for Every Dollar Spent
- Attractive Roadsides

Road & Bridge Design

- Smooth and Unrestricted Roads and Bridges
- Innovative Transportation Solutions
- Fast Projects that are of Great Value
- Best Value for Every Dollar Spent

Advanced Materials for Roads & Bridges

- Smooth and Unrestricted Roads and Bridges
- Roadway Visibility
- Innovative Transportation Solutions
- Fast Projects that are of Great Value
- Environmentally Responsible
- Best Value for Every Dollar Spent

Transportation Security

- Uninterrupted Traffic Flow
- Smooth and Unrestricted Roads and Bridges
- Safe Transportation System

Modal Access & Mobility

- Partner with Others to Deliver Transportation Services
- Environmentally Responsible
- Efficient Movement of Goods
- Easily Accessible Modal Choices

Economic Issues Related To Transportation

- Partner with Others to Deliver Transportation Services
- Leverage Transportation to Advance Economic Development
- Fast Projects that are of Great Value
- Best Value for Every Dollar Spent

Customer Communication & Expectations

- Personal, Fast, Courteous and Understandable Response to Customer Requests
- Environmentally Responsible
- Customer Involvement in Transportation Decision-Making
- Convenient, Clean & Safe Roadside Accommodations
- Attractive Roadsides
- Accurate, Timely, Understandable and Proactive Transportation Information

Funding & Finance Issues

- Partner with Others to Deliver Transportation Services
- Leverage Transportation to Advance Economic Development
- Fast Project That Are of Great Value
- Best Value for Every Dollar Spent
- Advocate for Transportation Issues

Current Research by Focus Areas

Highway Safety

Current projects in support of this focus area:
- RI05-037 Automatic Flagger Assistance Device
- RI05-039 Evaluation of Brifen Wire Rope Safety Fence
- RI00-024 Sign Component Test Deck
- PD01-021 Waterborne Traffic Paint and Bead Combination 4th Generation
- PD01-027 Investigation of Centerline Rumble Strip
- PD02-008 3M Linear Delineation Systems
- PD02-031 All Weather Wet Reflective Tape
- PD03-020 Epoplex LS-90 Pavement Marking Material
- PD05-012 Study of Modified Urethane Traffic Striping Paint

Traffic Management

Current projects in support of this focus area:
- RI02-023 Traffic Adaptive Speed Control
- RI05-043 Dynamic Late Merge System

Transportation Management Systems

Current projects in support of this focus area:
- RI01-007 Development and Implementation of Environmental Roadside Inventory
- RI04-001 Sign Shop Process Study
- TPF-5(063) Transportation Asset Management
- TPF-5(111) Development of Standards for Geotechnical Management System

Road & Bridge Design

Current projects in support of this focus area:
- RI77-022 Roadway Design Variable to Reduce D-Cracking
- RI91-013 Field Survey of D-Cracking in Pavements with Differing Aggregates
- RI97-043 Ultra-Thin Whitetopping for Pavement Rehabilitation, D7, Rte 60, Neosho, Newton Co.
- RI99-012 Evaluation of Ultra-Thin Whitetopping, D1, Rte 169 and YY, Buchanan County
- RI99-012B Evaluation of Ultra-Thin Whitetopping, D4, Rte 291 and 78, Jackson County
- RI99-026 Shear Tests of High Performance Steel Hybrid Girders
- RI00-059 Evaluation of Performance Serviceability of HPS Girders
- RI02-002 Steel Free Hybrid Reinforcement System for Concrete Bridges (Phase I)
- RI02-002B Implementation of Steel Free Hybrid Deck (Phase II)
- RI02-022 Preservation of Missouri Transportation Infrastructure: Flexural Upgrade of Deficient Bridges with Composites
- RI03-007 Performance Evaluation of Precast Prestressed Concrete Pavements
- RI04-002 AASHTO M-E Pavement Design Guide Implementation in Missouri

Road & Bridge Design (cont'd.)

- RI04-027 Deck Replacement With Precast Reinforced Concrete Systems
- RI05-024 Performance of Bridge Decks Using Precast, Prestress Deck Panels in Missouri
- TPF-5(048) Accelerated Testing Facility

Advanced Materials for Roads & Bridges

Current projects in support of this focus area:

- RI92-004 Statewide Study of Cathodic Protection Systems
- RI97-037 Effects on Freeze-Thaw Durability of Concrete containing HRWR
- RI98-006 An Evaluation and Determination of the Variability Existing in ASTM C-457 Using the Linear Traverse Method/Development of an Automated System to Analyze Hardened Concrete
- RI98-007D Slope Stabilization Using Recycled Plastic Pins – Phase III
- RI99-035 Strength and Durability Characteristics of a 70% Ground Granulated Blast Furnace Slag Concrete Mix
- RI00-027 Stainless Steel Reinforcing Bars in Bridge Decks
- RI03-004 Evaluation and Implementation of the Air Void Analyzer (AVA) in Missouri
- RI04-051 Bridge Deck Concrete Sealers
- RI05-030 Pavement Base Permeability Testing for US63
- RI05-044 Arc-Spray Galvanic Anode for Bridge Substructure
- TPF-5(066) Material and Construction Optimization for Prevention of Premature Pavement Distress in PCCP
- TPF-5(092) Test and Evaluation of Materials, Equipment, and Methods for Winter Maintenance
- TPF-5(021) North Central Superpave Center
- National Center for Asphalt Technology (NCAT) Part II

Transportation Security

Current projects in support of this focus area:

- RI02-010 Post Earthquake Damage Evaluation of Bridge Structures
- RI02-011 Seismic Retrofit Techniques for Beam Caps
- RI03-029 Comprehensive Shear-Wave Velocity Study
- RI04-007 Assessment and Analysis of Natural Hazards to Missouri Radio Tower Network

Modal Access & Mobility

Current projects in support of this focus area:

- RI03-056 Airport Project Economic Benefit Study
- RI05-041 Inter City Bus Demand Study
- RI05-042 Assessment and Evaluation of Missouri Port and Waterways Needs

Economic Issues Related To Transportation

Current projects in support of this focus area:

- REMI analyses of selected projects and programs
- RI05-045 Using GIS Based Business locations to Understand Business Development and Movement near Transportation Projects
- RI05-046 Increased Interagency Partnering and Local Planning to Increase Development Potential

Customer Communication & Expectations

Current projects in support of this focus area:

- RI05-002 Tracker Customer Involvement and Performance Surveys
- RI05-035 MoDOT Customer Satisfaction Tracking for FY06
- Community Relations Advance
- RI05-047 Evaluation of D4 Customer Satisfaction Survey Data
- RI05-034 Customer Satisfaction Survey of Missouri Drivers

Funding & Finance Issues

Current projects in support of this focus area:

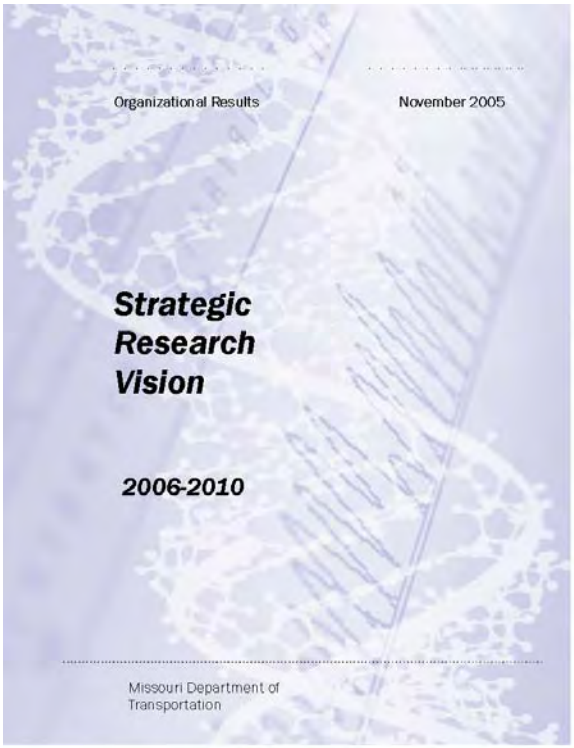
- Innovative Finance Development Team (In conjunction with various MoDOT work units, local development interests, and Missouri Department of Economic Development)

Next Steps

As the framework for the development of MoDOT's annual research program, the Strategic Research Vision will play a vital role as research ideas are identified and developed into research projects. These projects will address a pertinent need and support MoDOT's delivery of a world-class transportation experience that delights our customers and promotes a prosperous Missouri.

As we further mature our research program, every effort will be made to ensure ideas initiated and projects pursued align with the Strategic Research Vision. However, while the vision is critical in establishing the framework for our research programming, it's likely issues and projects will arise, which may not directly fit in one of the ten focus areas. Nonetheless, we will continue to address critical research needs in a timely fashion.

Developing our research program is a dynamic process. We will continue to review our vision, as appropriate, to position our dollars where they will have the greatest return. The opportunities ahead are endless as we collaborate with our research partners in bringing solutions and innovation to our transportation system for a better Missouri.



As part of a collaborative partnership, the Missouri Transportation Institute evaluates research ideas. If you think you have a research idea in one of our focus areas, please contact MTI at (573) 341-7639 or visit them on the Web at http://campus.umr.edu/mti/feedback.htm.